

THURSDAY, MAY 28, 1903.

THE ERUPTIONS OF MONT PELÉE.

Mont Pelée and the Tragedy of Martinique. By Angelo Heilprin. Pp. xiii + 335. (Philadelphia and London: J. B. Lippincott Company.) Price 15s. net.

THERE have been not a few greater catastrophes than that in which the city of St. Pierre was annihilated, and all its inhabitants (with only one or two exceptions) killed in a few minutes, but the peculiar circumstances of that tragedy have combined to bestow on it a great amount of interest. The city was one of the fairest in the western hemisphere, and no less famous for its profligacy than for its beauty. The suddenness with which it was destroyed, the awful circumstances with which this was attended, and the strange and almost unprecedented nature of the calamity have all combined to lend it a peculiar horror. At first the newspapers were filled with lurid and incoherent accounts of what had taken place, and all manner of exaggerations regarding the condition of Martinique were mingled with the most gloomy forebodings regarding the future of the island. In course of time a more rational spirit prevailed, but it is perhaps even yet too soon to expect a calm and entirely scientific study of all the remarkable features of the catastrophe.

Meanwhile the facts are being carefully sifted by various scientific men, and to the brief reports already published by Prof. R. T. Hill, Mr. E. O. Hovey, and the Commissioners of the French Academy of Science, this most interesting volume by Prof. Heilprin is a very welcome addition. In many ways the author of this book combines the qualifications necessary for successful treatment of the subject. He is an eminent naturalist, a much travelled geographer, and to his scientific knowledge he adds a dauntless courage which has enabled him to face calmly all the dangers of the dreaded volcano of Martinique. The book, moreover, is written in a style so graphic and vigorous that the reader is carried along in breathless interest, and no one who can enjoy a thrilling tale of adventure, however little he may be interested in scientific theories about volcanoes, could possibly put it down until he had reached the concluding page. The photographic illustrations are excellent. Many of them have been taken from Prof. Heilprin's negatives; others are from other sources, and have already appeared in the newspapers.

To those who have followed carefully the history of the eruptions, there is a great deal in the book that is not new. Much of it has appeared already in magazine articles by Prof. Heilprin and other writers, but even when following a well-worn path, the author is never dull, and his *résumé* of the earlier accounts is valuable, if only because he was one of the first scientific men to reach the island after the tragedy, and had in consequence special facilities for sifting the evidence before that rank growth of misstatement and exaggeration, which rapidly sprang up, had time to reach its full development. This, however, is merely the prelude to his tale, and the interest deepens when

he describes the efforts he made to obtain a view of the crater near the summit of the mountain, and to study the processes at work there. He was the first to reach the actual summit after the tragedy of May, 1902, but luck was against him, and the mountain was veiled in mist; next day he returned, but still was unable to make out the details of the interior of the crater. In this he was not more unfortunate than other observers; we met a newspaper correspondent in Fort de France last year who had been five times on the top of Montagne Pelée, and had failed to secure a single photograph that would bear reproduction. As a matter of fact, those who would learn the condition of the crater should refer to the descriptions by Mr. Hovey and Prof. Lacroix, whose accounts are much clearer than those given in the book before us.

Though baffled, he was not defeated, and in the month of August Prof. Heilprin returned to Martinique to renew his investigations. He again ascended the mountain from its eastern base, and this time it is clear that he had a very narrow escape with his life. The volcano was very active, and was emitting a vast cloud of dust and casting great bombs for hundreds of yards from the crater. The descriptions of the scenes on the upper part of the volcanic cone are vivid, and to those who know with what suddenness the deadly black cloud can rise from the crater and sweep down the mountain slopes to the sea, it is evident that the party carried their lives in their hands. Not much information of scientific value was likely to be obtained in the circumstances, for it was impossible to approach sufficiently near the crater to see what was going on there. Prof. Lacroix has subsequently ascertained that what was at first regarded as an interior cone of ash is really a solid pillar of lava rising up from the bottom of the crater until it overtops the former summit of the mountain. The lava of Montagne Pelée, in fact, is so viscous and so nearly consolidated that it is being forced out as ice or lead can be forced through a narrow orifice under great pressure. So long as it is in its present condition it cannot possibly flow over the ground, and when the steam within it expands the mass is in large part shivered into dust.

The second fatal eruption of Pelée, that in which the village of Morne Rouge was destroyed and 2000 lives were lost, took place when Prof. Heilprin was residing on the mountain. His narrative of the events is wonderfully graphic, and though the fatal cloud was discharged at night, and in the darkness it was not possible to see exactly what happened, it is quite certain that the eruption was of the same type as that in which St. Pierre was levelled with the ground. Next day Prof. Heilprin visited the scene of the disaster and interviewed the survivors. Their experiences seem to have been very similar to those of the inhabitants of the Carib country of St. Vincent during the great eruption of May 7. The chapters of this book in which the story of this eruption is recorded are a very valuable contribution to the scientific history of the activity of Montagne Pelée.

The concluding chapter, in which the phenomena of the eruption are discussed, is in some ways not the least interesting in the book. From it we learn that

the author has discarded his bizarre hypothesis that the black cloud consists of "carbon gases" produced by the distillation of beds of asphalt in Tertiary deposits beneath the volcano. He is now of the same opinion as other scientific men, viz., that the main constituents of the cloud were steam, hot dust and sulphurous acid. We can hardly pass without remark his extraordinary calculations of the amount of dust ejected by Montagne Pelée during the latter part of 1902. He arrives at the conclusion that 480 millions of cubic feet of solid sediment have been discharged every hour, and is inclined to believe that this is an under-estimate. So far at least as regards that period when we were in Martinique in July, this is a wild exaggeration. For hours at a time the volcano emitted hardly a puff of steam; a casual visitor might never have suspected that the deep gully near the summit led into the crater; the amount of dust discharged was negligible. Yet this was the period immediately preceding and immediately following the eruption of July 9, which was one of the most important eruptions of last summer. When Prof. Heilprin adds, "We ask ourselves the questions—What becomes of the void that is formed in the interior? What form of new catastrophe does it invite?" we seem to hear the echo of the dire predictions which resounded in the colonial journals about twelve months ago.

JOHN S. FLETT.

EXPERIMENTS ON ANIMALS.

Experiments on Animals. By Stephen Paget. 1p. xvi+387. New and revised edition. (London: Murray, 1903.) Price 6s.

A BOOK which reaches a second edition in two years can do so only in response to some distinct demand, and such a demand is in itself no little recommendation as to its merits. The author of the book, Mr. Stephen Paget, was for twelve years secretary to the Association for the Advancement of Medicine by Research, and it was therefore his business "to know something about experiments on animals, and to follow the working of the (Vivisection) Act of 1876." He is therefore to a peculiar degree competent to write a book dealing with these subjects, and it is a matter for congratulation that the council of the Association above mentioned decided that the book should be written with a view to general reading. Though in this present edition all references to anti-vivisection societies and their methods are very wisely omitted, yet the obvious purpose of the book is to combat the misleading statements which these societies have disseminated broadcast amongst the un-instructed public, and to afford information concerning the results achieved by such experiments on animals, whereby the public may be enabled to judge for themselves as to the claims of the anti-vivisectionists. To quote Lord Lister, who writes an introduction to this volume,

"The action of these well-meaning persons is based upon ignorance. They allow that man is permitted to inflict pain upon the lower animals when

some substantial advantage is to be gained; but they deny that any good has ever resulted from the researches which they condemn."

Mr. Paget's object is therefore to convey to the general reader some idea of the inestimable advantages which have accrued to medical science from experimental research on animals. In the closing pages of the book, moreover, he points out that the vast majority of the experiments carried out at the present day in Great Britain involve no pain at all to the animals operated upon. The comparatively few animals subjected to painful experiment

"cannot be compared with the same number of horses, cattle, or sheep mutilated by breeders and farmers; for these mutilations are done, some of them, without any anæsthetic. They cannot be compared with the same number of pheasants or rabbits badly wounded, but not killed, in sport; for the animals thus wounded receive no subsequent care, and, if they are in pain, nobody puts them out of it."

To come to the actual contents of the book, we find that Mr. Paget devotes more than 200 pages to the consideration of experiments in bacteriology, but only 84 pages to experiments in physiology. It is to be regretted that the subject which forms the foundation of all medical science should be treated so cursorily, but in excuse it may be admitted that the practical importance of much physiological work is indirect, whilst that of bacteriological work is obvious and immediate.

In his account of experiments in physiology, Mr. Paget gives a concise *résumé* of certain chapters in the history of physiology. The circulation of the blood is treated rather more fully than other subjects, though Harvey's work receives but four pages of description and quotation. In the chapter on gastric juice, Mr. Paget very pertinently refers to the well-known case of Alexis St. Martin, in whom a permanent gastric fistula was produced by a gun-shot wound. Yet in spite of the numerous experiments made upon this man by Dr. Beaumont, no pain was experienced. Presumably, therefore, artificially produced fistulæ in animals are equally painless. In the chapter upon the nervous system, the important results obtained by Galen are described, and it is pointed out that the men who followed after him, though they worshipped his name, missed the whole meaning of his work through their neglect of the experimental method which he employed.

In his pathological chapters Mr. Paget gives a brief account of inflammation and suppuration, and then passes on to serum therapeutics. As the book is admittedly for general readers, it is a pity that no general introduction to this subject is given. The meaning of antitoxins and their method of preparation are nowhere described. The various chapters adduce a very copious body of facts as to the cure of diseases by serum-therapy and preventive inoculation, but the absolute necessity for experiments on animals, not only for the discovery and elucidation of the curative and preventive methods, but for the direct derivation of the immunising sera, is implied rather than clearly stated in so many words. In fact, it looks